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APR 27 2006

60246-264; 10807/10,785

**UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Concha, et al.  
Serial No.: 10/760,668  
Filed: 1/20/2004  
Art Unit: 3744  
Examiner: Jiang, Chen Wen  
Title: ENERGY-EFFICIENT HEAT PUMP WATER HEATER

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**APPEAL BRIEF**

Dear Sir:

Subsequent to the filing of the Notice of Appeal on February 28, 2006, appellant now submits its brief. Fees in the amount of \$500.00 may be charged to Deposit Account No. 03-0835 in the name of Carrier Corporation. If any additional fees are necessary, you are hereby authorized to charge the same deposit account number.

**REAL PARTY IN INTEREST**

The real party in interest is Carrier Corporation, the assignee of the entire right in this application.

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### RELATED APPEALS AND INTERFERENCES

There are no prior or pending appeals, interferences or judicial proceedings related to this appeal, or which may directly affect or may be directly affected by, or have a bearing on, the Board's decision in this appeal.

### STATUS OF CLAIMS

Claims 1-20 are pending. Claims 4, 12 and 17 are objected to as containing allowable subject matter. Claims 1, 2, 6-10, 14, 15, 19 and 20 are rejected under 35 USC §102(b). Claims 3, 11, 16 and 18 are rejected under 35 USC §103.

### STATUS OF AMENDMENTS

All amendments have been entered.

### SUMMARY OF CLAIMED SUBJECT MATTER

This application relates to a way of controlling a heat pump to provide heated refrigerant to heat fluid, and in particular hot water supplied to a hot water tank. The patent claims a method and system wherein a tank temperature is monitored. If the tank temperature is below a first threshold (see Fig. 2, step 201), then the heat pump is energized (step 202). Another reading is taken (step 204) and if this other reading indicates that a particular temperature exceeds a second threshold (step 208), then the heat pump would be energized. A similar method is shown in Figure 3. Various methods can be utilized to calculate or read a temperature for the second threshold to turn off the system.

Independent claim 1 is a claim to a fluid heating system. It requires a heat pump (100, see Fig. 1, paragraphs 10 and 11), a tank (102), a tank inlet (110), and a tank outlet (112). A tank temperature sensor (120) senses the fluid temperature in the tank.

A controller (118) controls the heat pump based on a first threshold and a second threshold higher than the first threshold. An output from the tank temperature sensor is taken and the controller energizes the heat pump when the tank temperature sensor output falls below

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this first threshold. The controller causes the heat pump to de-energize when a temperature within the fluid heating system reaches the second threshold.

Independent claims 9 and 14 require similar limitations in a method claim (9) and a claim to a control (14).

Claims 6, 7, 19 and 20 all require that the heat pump is a transcritical vapor compression cycle, and utilize carbon monoxide.

### GROUND OF REJECTION TO BE REVIEWED ON APPEAL

#### Summary of the Rejections:

Claims 1, 2, 6-10, 14, 15, 19 and 20 stand finally rejected under 35 USC §102(b) as being anticipated by Sakakibara, et al. U.S. Patent 6,370,896 (hereinafter the '896 patent).

Claims 5, 13 and 18 stand rejected under 35 USC §103 as being unpatentable over the '896 patent taken with the Stewart U.S. Patent 5,367,602.

Claims 3, 11 and 16 stand rejected under 35 USC §103 over the '896 patent taken with the Yamaguchi, et al. Japanese reference 62010525.

### ARGUMENT

A. The base rejections over the '896 patent fail to meet elements of the independent claims.

The '896 patent discloses a system wherein a heat pump is energized when a temperature in a tank drops below a first level. However, there is nothing within the '896 patent that discloses when the heat pump is de-energized. The heat pump could be de-energized by a timer, or could perhaps be de-energized when the tank temperature reaches that first threshold.

The patent claims, however, require that there be a second threshold that is higher than the first threshold, and that the second threshold is not before the heat pump is deactivated. This provides the benefit of ensuring the water has reached a desired level. Water can be at different temperatures within a storage tank at different levels. This can tend to lower the desired temperatures. The present invention addresses this problem. The '896 patent does not.

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Simply, the rejection is improper and the reference does not anticipate the claims. For this reason, the independent claims 1, 9 and 14 are all allowable over the prior art of record.

B. The rejection of claims 5, 13 and 18 is separately contested.

The examiner argues that the '896 patent can be modified with the Stewart patent to meet these claims. Essentially, it is the examiner's opinion that moving the sensor of the '896 patent from its location on a tank, to a tank outlet would have been obvious. However, since what is important is the temperature within the tank, and since at many times there may be no output flow from the tank, and in addition there may be temperature gradients within the tank, there is no reason to modify the '896 patent taken with Stewart. For at least the reasons mentioned above, and the fact that the use of a temperature sensor in a distinct location would require additional temperature sensors (the independent claim requires that a tank temperature be taken initially), there is simply no suggestion to combine these references outside of applicant's disclosure.

For the reasons set forth above, the rejection of these claims should be reversed.

C. The rejection of claims 3, 11 and 16 is improper.

The examiner argues that it would have been obvious to utilize a sensor at a tank inlet to de-energize the heat pump in the '896 patent. This rejection is improper for the exact reasons mentioned above with regard to the combination of the '896 patent and Stewart. The examiner argues that the '896 patent can be modified with the Stewart patent to meet these claims. Essentially, it is the examiner's opinion that moving the sensor of the '896 patent from its location on a tank, to a tank outlet would have been obvious. However, since what is important is the temperature within the tank, and since at many times there may be no output flow from the tank, and in addition there may be temperature gradients within the tank, there is no reason to modify the '896 patent taken with Stewart. For at least the reasons mentioned above, and the fact that the use of a temperature sensor in a distinct location would require additional temperature sensors (the independent claim requires that a tank temperature be taken initially), there is simply no suggestion to combine these references outside of applicant's disclosure.

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**CLOSING**

For the reasons set forth above, the rejection of all claims is improper and should be reversed. Such action is earnestly solicited.

Respectfully submitted,



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Dated: April 26, 2006

**CERTIFICATE OF TRANSMISSION UNDER 37 CFR 1.8**

I hereby certify that this correspondence is being facsimile transmitted to the United States patent and Trademark Office, fax number (571) 273-8300, on February 28, 2006.



Laura Combs

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CLAIM APPENDIX

1. A fluid heating system, comprising:  
a heat pump;  
a tank;  
a tank inlet that carries fluid from the heat pump to the tank;  
a tank outlet that carries fluid from the tank to the heat pump;  
a tank temperature sensor that measures a fluid temperature in the tank; and  
a controller that controls the heat pump based on a first threshold, a second threshold higher than the first threshold, and at least an output from the tank temperature sensor, wherein the controller energizes the heat pump when the tank temperature sensor output falls below the first threshold, said controller causing the heat pump to de-energize when a temperature within the fluid heating system reaches the second threshold.
2. The fluid heating system of claim 1, wherein the controller causes the heat pump to de-energize when the tank temperature sensor reaches the second threshold.
3. The fluid heating system of claim 1, further comprising a tank inlet temperature sensor, wherein the controller de-energizes the heat pump when a value based on an output from the tank inlet temperature sensor reaches the second threshold.
4. The fluid heating system of claim 3, wherein the value is an estimated tank outlet temperature calculated from the output from the tank inlet temperature, a system capacity and a flow rate, and wherein the controller causes the heat pump to de-energize if the estimated tank outlet temperature reaches the second threshold.
5. The fluid heating system of claim 1, further comprising a tank outlet temperature sensor, wherein the controller de-energizes the heat pump when an output from the tank outlet temperature sensor reaches the second threshold.

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6. The fluid heating system of claim 1, wherein the heat pump employs a transcritical vapor compression cycle.

7. The fluid heating system of claim 1, wherein the heat pump uses carbon dioxide as a refrigerant to obtain the transcritical vapor compression cycle.

8. The fluid heating system of claim 1, wherein the tank temperature sensor is disposed generally at a midpoint portion of the tank.

9. A fluid heating method, comprising, comprising:

measuring a tank temperature; and

controlling a heat pump based on a first threshold, a second threshold higher than the first threshold, and at least the tank temperature, wherein the heat pump is energized when the tank temperature falls below the first threshold, causing the heat pump to de-energize when a temperature within the fluid heating system reaches the second threshold.

10. The fluid heating method of claim 9, wherein the controlling step comprises de-energizing the heat pump when the tank temperature reaches the second threshold.

11. The fluid heating method of claim 9, further comprising measuring a tank inlet temperature, wherein the controlling step comprises de-energizing the heat pump when a value based on the tank inlet temperature reaches the second threshold.

12. The fluid heating method of claim 11, wherein the value is an estimated tank outlet temperature calculated from the tank inlet temperature, a system capacity and a flow rate, and wherein the heat pump is de-energized if the estimated tank outlet temperature reaches the second threshold.

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13. The fluid heating method of claim 9, further comprising measuring a tank outlet temperature, wherein the controlling step comprises de-energizing the heat pump when the tank outlet temperature reaches the second threshold.

14. A fluid temperature control for a fluid heating system, comprising:  
a heat pump;  
a tank temperature sensor that measures a fluid temperature in a tank; and  
a controller that controls the heat pump based on a first threshold, a second threshold higher than the first threshold, and at least an output from the tank temperature sensor, wherein the controller energizes the heat pump when the tank temperature sensor output falls below the first threshold, said controller causing the heat pump to de-energize when a temperature within the fluid heating system reaches the second threshold.

15. The fluid temperature control of claim 14, wherein the controller causes the heat pump to de-energize when the tank temperature sensor reaches the second threshold.

16. The fluid temperature control of claim 14, further comprising a tank inlet temperature sensor, wherein the controller de-energizes the heat pump when a value based on an output from the tank inlet temperature sensor reaches the second threshold.

17. The fluid temperature control of claim 16, wherein the value is an estimated tank outlet temperature calculated from the output from the tank inlet temperature, a system capacity and a flow rate, and wherein the controller causes the heat pump to de-energize if the estimated tank outlet temperature reaches the second threshold.

18. The fluid temperature control of claim 14, further comprising a tank outlet temperature sensor, wherein the controller de-energizes the heat pump when an output from the tank outlet temperature sensor reaches the second threshold.



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19. The fluid temperature control of claim 14, wherein the heat pump employs a transcritical vapor compression cycle.

20. The fluid temperature control of claim 19, wherein the heat pump uses carbon dioxide as a refrigerant to obtain the transcritical vapor compression cycle.

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**EVIDENCE APPENDIX**

None.

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**RELATED PROCEEDINGS APPENDIX**

None.